Adoption of a common protocol for MEDiterranean Acoustic Surveys (MEDIAS)

in the framework of European Data Collection Regulation

Athens 25–26 February 2008

Steering Committee Report

The current workshop took place in Athens between 25 and 26 /2/2008 following the establishment of a MEDIAS Steering Committee in the Regional Coordination Meeting (RCM) for the Mediterranean held in Cyprus in May 2007. The aim of the workshop was to adopt a common Protocol for a Pan-Mediterranean Pelagic survey (MEDIAS) within the framework of the DCR, according to the recommendation of the RCM and the decision of the Liaison Meeting.

Participants in the meeting were representatives from all European Union countries involved in acoustic surveys in the Mediterranean (i.e. Greece, Italy, Slovenia, Malta, France and Spain) and the facilitator for the Working Group on Small Pelagic Species (Sub-Committee for Stock Assessment) of the GFCM (See list of participants ANNEX I).

During the first day of the meeting, after the welcome to participants by the Director of the Institute of Marine Biological Resources of the Hellenic Centre for Marine Research, Dr. C. Papaconstantinou, the participants adopted the agenda of the Workshop. (See agenda of the meeting ANNEX II)

Dr. Antonio Cervantes from the Directorate General for Fisheries and Maritime Affairs presented the background and the status of the Pan-Mediterranean Pelagic Survey concerning the recommendations of the two Regional Coordination Meetings for the Mediterranean (held in Malta and Cyprus), the decisions of the Liaison Meeting and the suggestions of the SGRN of STECF regarding the incorporation of the Pan-Mediterranean Pelagic Survey in the new Data Collection Regulation.

At the beginning of the discussion, the description of the methodology followed in each area up to now was presented and the different protocols were discussed in a comparative way, in order to highlight the similarities and differences among them. During this session, a first discussion on the harmonization of the different protocols has been done. The methodology and protocols for each survey is presented in the following Table 1.

Table 1. Acoustic parameters used by the Institutions in the surveys in the Mediterranean.

Parameter	Gulf of Lions (IFREMER)	Aegean Sea (HCMR)	Adriatic Sea (ISMAR – FRIS)	Sicilian channel (IAMC-MCFS)	Iberian coast (IEO)
Survey Identity					
Country	France	Greece	Italy & Slovenia	Italy & Malta	Spain
Geographic area	Gulf of Lions	northern Aegean Sea	Western part of the Adriatic Sea and Slovenia waters (in 2001 and 2007)	G.S.A. 16 (1998-2007) G.S.A 15 (2004-2007)	Spanish Mediterranean Sea (continental shelf)
Area covered	3 300 NM^2	9 000 NM^2	Italy: 15 000 NM^2 Slovenia: 117 NM^2	2 700 NM^2	8 829 NM^2
Days at sea	20	40	40 + 1	10	31
Indicative - available time series of acoustic surveys	Since 1995	Since 1995 with gaps	Since 1976	Since 1998	Since 1993
Vessel	RV "L'EUROPE	RV "PHILIA"	RV "Dallaporta"	RV "Dallaporta"	RV "CORNIDE DE SAAVEDRA"

Parameter	Gulf of Lions (IFREMER)	Aegean Sea (HCMR)	Adriatic Sea (ISMAR – FRIS)	Sicilian channel (IAMC-MCFS)	Iberian coast (IEO)
Survey design					
Month/Period of the year that the survey take place	July	June	June to September	June to September	November and December, anchovy recruitment period in the area
Transects design	perpendicular to bathymetry	perpendicular to bathymetry Zig-zag inside the gulfs	Zig-zag transects alternately parallel	perpendicular to bathymetry	perpendicular to the coast
Inter-transect distance (NM)	12	10	10	4-8	8 in wide continental shelf; 4 in narrow shelf
Time of day in which acoustic data are collected	Daytime	Daytime	Fulltime	Full time	Daytime.
EDSU (nm)	1	1	1	1	1
Bottom depth (min, m)	15	10	10	10	30
Echo sounding depth (min, m)	5	5	7	7	5
Echo sounding depth (max, m)	400	230	250	300	200-220
Fishing gear	Pelagic trawl	Pelagic trawl	Pelagic trawl	Pelagic trawl	Pelagic trawl
Target species	Anchovy and Sardine	Anchovy and Sardine	Anchovy, sardine and sprat	Anchovy and Sardine	Anchovy and Sardine
Other species	All pelagics	Horse mackerel, mackerel, gilt sardine	Horse mackerel, chub mackerel, gilt sardine, etc.	Mackerel, Sardinella Horse mackerel	Horse mackerel, chub mackerel, gilt sardine, bogue
Echo sounder parameters					
Echo sounder	EK500 puis ER 60	Biosonic DTX	Simrad EK500	Simrad EK-60	Simrad EK60 since 2006. Previous years Simrad EK500
Frequency for assessment (kHz)	38	38	38	38	38
Complementary frequencies (kHz)	120,	120	120, 200	120, 200	18,70,120,200 (since 2006)
Pulse duration (ms)	1.0	0.5	1, 1, 0.6	1	1
Threshold for acquisition (db)	-80	-80	-70	No limit with the raw data	No limit with the raw data
Threshold for assessment (db)	-60	-70	-70	-60	-60
Calibration (No per survey)	1 per survey	1 or 2 per survey	1 per survey	1 per survey	1 per survey
Applied TS (db) [20Log L(cm)]					
Sardine	-71.0	-72.6	-72.5	-70.51	-72.6
Anchovy 20Log L(cm)	-71.2	-71.2	-74.6	-75.3	-72.6
Horse mackerel	-68.7			-71.2	-68.7
Mackerel	-70			-71.2	-84.9
Sprat	-71.2		-71.7	-	
Spanish Mackerel	-70				
Blue whiting				-	

Parameter	Gulf of Lions (IFREMER)	Aegean Sea (HCMR)	Adriatic Sea (ISMAR – FRIS)	Sicilian channel (IAMC-MCFS)	Iberian coast (IEO)
Mackerel (*S. japonicus*)					-68.7
Bogue					- 67
Sardinella	-71.2			-71.2	-72.6
Abundance estimates					
Software for analysis	Movies	SonarData Echoview	SonarData Echoview, GFRDBS (CNR – ISMAR software)	SonarData Echoview	SonarData Echoview
File format	*.hac	*.ev, *.hac	*.hac, *.ev, *.xls, *.txt, *.ek5	*.hac, *.raw, *.bot, *.idx	*.ev, *.hac, *.raw
Inter - transect	Acoustic energy in the inter-transect track not taken into account	Acoustic energy in the inter-transect track not taken into account	Acoustic energy in the inter-transect track not taken into account	Acoustic energy in the inter-transect track not taken into account	Acoustic energy in the inter-transect track not taken into account
Echo partitioning into species	Echo trace classification based on echogram visual srcutinisation (Direct allocation by type of structure and allocation on account of representative fishing station)	Echo trace classification based on echogram visual srcutinisation (Direct allocation and allocation on account of representative fishing station)	Frequencies comparison, pelagic trawl, TS analysis when needed	Visual analysis of echogram and from results of control trawl	Allocation on account of representative fishing station
Abundance indices estimated	Total and by zone pelagic biomass and biomass per species, Total and by zone pelagic number and number per species, Pelagic biomass and biomass per species,Biomass per mile, Numbers per species per mile	NASC per EDSU: Total & per species Total biomass Biomass per mile Biomass per species Number per species Numbers/species/age Biomass/species/age	Total pelagic biomass and biomass per species (possible NASC per EDSU, total pelagic biomass per mile)	NASC per ESDU, Total Biomass, Biomass per age	NASC per EDSU, Numbers per age, Biomass per age
Fish sampling					
Codend	12 mm	8 mm	9 mm of mesh side; 18 mm of mesh size	9 mm of mesh side; 18mm of mesh size	
Vessel speed during fishing	3.5-4.5 kn	3.5-4 kn	3.5-4 kn	3.5-4 kn	3.5-4 kn
Time of day	Daytime	Daytime / night time	Daytime/night time	Daytime / night time	Daytime for echo traces identification / night time

Parameter	Gulf of Lions (IFREMER)	Aegean Sea (HCMR)	Adriatic Sea (ISMAR – FRIS)	Sicilian channel (IAMC-MCFS)	Iberian coast (IEO)
					for evaluation (when the species are dispersed near the surface).
No of hauls (min-max)	17-37	20-37	40-50	20-25	50-70
Sampling intensity	as many as possible, when echo traces are visible, to • ensure identification of echo traces • obtain length structure of the population • obtain species composition • get biological samples	as many as possible, when echo traces are visible, to • ensure identification of echo traces • obtain length structure of the population • obtain species composition • get biological samples	as many as possible, when echo traces are visible, to • ensure identification of echo traces • obtain length structure of the population • obtain species composition • check length-weight equation	Depending on bottom type and time of day, as many as possible (generally 4 per day), targeting an uniform distribution	as many as possible, when echo traces are visible, to • ensure identification of echo traces • obtain length structure of the population • obtain species composition • check length-weight equation
Biological and environmental parameters					
Fish measurements	Total length or Fork length for Scomber spp Total weight by length classes Age in recent years for anchovy and sardine	Total length Total weight Eviscerated weight Gonad weight Stage of maturity Age	Total length Total weight Sex Stage of maturity Age	Basic: individual Total Length, Total Weight by length classes Other: Eviscerated weight, Gonad weight, Stage of maturity, Age	Total length Total weight Sex Stage of maturity Age
Oceanographic Parameters taken in stations: CTDs	CTD:T, S,	CTD: T, S, Fluor., par, plankton	CTD: T, S, Fluor., turbidity, oxygen	CTD: T, S, Fluor., par, plankton	CTD:T, S,
Oceanographic. Parameters taken continuously	T, S, (birds and mammals opportunistic)	mammals			T, S, CUFES, Birds

According to the SGRN recommendation ('Direct surveys' meeting, 12-16/2 2007, Brussels), each one of the surveys included in the Pan-Mediterranean survey should give information for management decisions, providing input to assessment of stocks which are managed internationally. Each survey should provide:

      i. Information on important age groups

ii. Information on biological parameters
iii. Information on trends

In a next step the working group agreed on the issues to discuss in the framework of the protocol of the Pan-Mediterranean acoustic survey concerning the acoustic methodology, the biological parameters collected in each survey and the reporting of the data.

The working group discussed issue by issue and agreed on the common protocol that will be followed in the MEDIAS survey. During the discussion the participants from IFREMER presented conclusions adopted by the coordinated survey for anchovy in the Atlantic (Bay of Biscay). So, the protocol of the respective survey in the Bay of Biscay, was taken into consideration in order to facilitate future collaboration between the two surveys.

The participants concluded that in this first approach for the harmonization of the acoustic surveys, in order to form and adopt a common protocol, the WG had to consider that:
a) each survey covers geographical areas with different sizes (see Table 2),
b) each country uses different research vessels and equipments and
c) the surveys are highly dependant on research vessel availability.
All these can cause differsification in certain aspects of the methodology among areas which are not expected to affect the requirements of the survey and the comparability of the results.

The workshop participants agreed the following:

1) Survey Identity. The geographical areas that will be covered by MEDIAS and the days at sea are presented in Table 2.

Table 2. The size of the geographical area that will covered by each Institute.

Country	Institute	Geographical area	Size of area	Duration of survey (days)
Greece	HCMR	Aegean Sea	9 000 NM^2	40
France	IFREMER	Gulf of Lions	3 300 NM^2	20
Slovenia	FRIS	Adriatic Sea (Slovenia)	117 NM^2	1
Italy	CNR-ISMAR	Adriatic Sea (Italy)	15 000 NM^2	40
Italy - Malta	CNR- IAMC	Sicily channel	2 700 NM^2	12
Spain	IEO	Iberian coast	8 829 NM^2	31

In the report to the DCR, the geographical area, the size of the area and the days at sea, as well as the vessel characteristics should be reported by each country.

Survey timing was defined after a detailed discussion taking into account:
1) The geographical boundaries of different stocks. It is known that three genetically different, major anchovy stocks exist in the Mediterranean: the north-western Mediterranean stock (mainly shared between Spain and France), the Adriatic Sea stock (mainly shared between Italy, Slovenia and Croatia) and the Aegean Sea stock;
2) The existing time series of data in each area. The historical time series are of great importance because the temporal (interannual) trend in biomass estimates is useful in assessment and the setting of reference points. Any revision on the methodology and the estimation procedures should go back and revise the past estimates.
3) The target of the survey according to the priorities that have been set by each country.
Surveys that are being held during the 2nd -3rd quarter of the year are targeting the spawning stock of anchovy and surveys that are being held during the 4th quarter are targeting the anchovy recruitment.
Based on these it has been agreed that:

A) The MEDIAS will cover the major anchovy stocks during the spawning period (June to September, 2nd -3rd quarter).

B) The spawning stock of the shared anchovy stock in the north western Mediterranean will be fully covered by a southern extension of the Gulf of Lions survey in summer.

C) The valuable time series of the Spanish recruitment survey should be continued.

2) Echo sounder parameters.

In all areas a split beam echo–sounder will be used for the echo–sampling. The angle beam of the echo–sounder will be reported. The frequency that will be used for assessment was agreed to be the 38 kHz, while complementary frequencies will be the 120 and/or 200 kHz, depending on the research vessel used. The pulse duration will be 1 ms, the threshold for data acquisition will be at - 80 dB and the ping rate will be set as fast as possible depending on depth, in order to assure good echo discrimination.

A detailed discussion took place, regarding the number of calibrations per survey, based also on the experience from the survey in the Bay of Biscay. It was agreed that one calibration of echo-sounder will be held per survey based on the procedure described in the manual of each echosounder and by Foote *et al.* (1987). The workshop discussed and concluded on a number of calibration parameters and results that should be included as a minimum in the survey report. These are tabulated in Annex III.

3) Survey Design.

The working group discussed in detail the sampling design followed in each region taking into account the peculiarities in the topography of each area. It was agreed that two aspects should be considered in choosing the direction and the type of transects (i.e. parallel or zig zag). Transects preferably run perpendicular to the greatest gradients in fish density, which is often related to gradients in bottom topography, meaning that transects will normally run perpendicular to the coastline/bathymetry. In cases that topography is complex like in the case of semi-closed gulfs transect design could be decided otherwise. The survey design in each area should be reported. The inter-transect distance should not exceed 12 NM based on preliminary studies of the spatial structure characteristics of small pelagics in the Mediterranean Sea.

Vessel speed during acoustic sampling should be adjusted depending on vessel noise as set by the ICES-WGFAST (WGFAST 2006). The working group agreed that vessel speed of 8-10 knots in adequate for a split beam echo sounder of 38kHz. At higher speeds, problems might encounter with engine noise or propeller cavitations. The noise of the vessel in different speeds should be reported.

It was strongly recommended that if species identification depends on recognition of schools on the echogram the survey will have to take place only during day-time, being interrupted during periods in the 24-hour cycle when the schools disperse. Otherwise, if available survey time does not permit this, echo sampling might be extended. In this case, echo allocation into species will not be based on school shape identification and justification should be given in the report that this does not affect the accuracy of the estimations

The working group agreed that transects should be extended as close to the coast as possible in order to obtain the best estimation for sardine. Because each survey uses research vessel of different size that sets a limit to the minimum distance from shore, it was suggested that acoustic sampling should be held at least from 20 m bottom depth, or less if possible. In each case the minimum bottom depth of each survey should be reported. The maximum echo-sounding depth should be 200

m and the minimum echo-sounding depth should be reported as it depends on the draught of the research vessel.

The working group decided that a workshop should be held in the framework of MEDIAS focusing on:

❖ The optimization of survey design. In this workshop, existing survey designs will be reviewed, area peculiarities (e.g. size of the area, topography, survey duration) will be taken into account and results from a geostatistical analysis applied to historic acoustic data from different areas in the Mediterranean Sea will be evaluated for survey design optimization, taking into account the spatial characteristics of small pelagic fish aggregations.

4) Acoustic methodology

The Elementary Distance Sampling Unit (EDSU) for echo integration will be 1 NM.

The acoustic energy in the inter-transect tracks will not be taken into account.

The working group agreed that for compatibility reasons all the data will be saved with a threshold for acquisition at -80 dB.

As the main objective is the optimum discrimination between fish and plankton, the threshold for assessment was set at -70 to -60 dB, depending
a) on noise level (-60 dB in case of high noise)
b) the peculiarities of each area regarding school morphology and plankton density (-60 when plankton is dense, but -70 dB when small schools dominate the area)
c) echo-sounder features
d) whether echo integration is based on school echo integration (-70 dB) or stratum integration (-60 dB) and
e) time of day that echo acquisition is carried out.

The working group concluded that the target species of the survey will be anchovy (*Engraulis encrasicolus*) and sardine (*Sardina pilchardus*).

The echo partitioning into species will be based on echogram visual scrutinisation. This will be done either by direct allocation based on the identification of individual schools and/or allocation on account of representative fishing stations.

Regarding the Target Strength (TS) equation that should be applied in each species, a detailed discussion took place among the working group participants. The possibility to apply in MEDIAS the target strength used for anchovy and sardine in the Bay of Biscay for compatibility reasons has been discussed. Dr. J. Masse informed the participants that the target strength used in the Bay of Biscay is currently under revision and no common target strength equation is applied. Furthermore, according to the biological background of target strength and other recent scientific findings, the target strength is likely to vary among stocks, areas and seasons. In the Mediterranean school characteristics vary largely among areas and the working group concluded to maintain, for the time being, the historical Target Strength equations used in each area for the target species. In each case, the TS equation applied should be reported. The application of new TS equations in the Mediterranean, common for all areas, would require the revision of the past estimates of the existing time series which would require time and effort. Such common TS equations must derive from *in situ* estimations of TS, preferably based on acoustic data from the Mediterranean Sea.

For this purpose the working group decided that a workshop should be held in the framework of DCR and MEDIAS coordination meetings on:

"Harmonisation and optimisation of acoustic methodology". In such a workshop issues regarding the estimations of common TS equations for each target species would be decided taken into consideration a) literature information and b) the application of different TS equations to existing raw acoustic data and the subsequent comparison of the results. Furthermore, all participants agreed to collect additional appropriate data during the 2008 survey for in situ TS estimations in each area.

Regarding acoustic data processing for the assessment of the target species, the use of Movies and / or Echoview software for the analysis and estimation of abundance has been agreed. For compatibility reasons, all data should be available into a common *.hac file format. Raw data will be stored within the responsibility of each country. The common *hac format will be also available for the requirements of the Data Collection Regulation (DCR).

5) Abundance indices.
Regarding stock assessment and the abundance indices that will be estimated and reported in the DCR within the framework of MEDIAS, the following have been agreed:

The target species of MEDIAS for assessment purposes will be anchovy (*Engraulis encrasicolus*) and sardine (*Sardina pilchardus*). For these two species, abundance estimates should be provided in the report. In addition, abundance indices could be given for all pelagic species in the community which are important in each area. Regarding these non–target species, Length– Weight relationships and Length frequency distributions will be provided.

The abundance indices that will be estimated by all MEDIAS participants and will be provided in the DCR report should include both NASC (independent from TS equations) and Biomass estimations and are listed below :
1. Total fish NASC per EDSU
2. Target Species NASC per EDSU
3. Biomass per EDSU per target species
4. Numbers per EDSU per target species
5. Number/age/Target species
6. Biomass/age/Target species

In addition it has been agreed that in the report for the DCR the following items will also be provided:
1. Point maps of total fish NASC
2. Point maps of target species in NASC/mile; biomass/mile.
3. Catch compositions of the hauls: pie-charts indicating biomass per species

Furthermore, the need for a common database has been discussed. The fields of a common acoustic database will be established by the MEDIAS participants in future meetings. The need for collaboration with respective surveys in the Atlantic (bay of Biscay) has also been discussed and agreed. In the framework of this collaboration, information and experience will be exchanged.

According to the standard methodology followed in acoustics, species allocation of the acoustic records is impossible if no trawl information is available. Fish sampling is required to collect representative samples of the fish population in order to identify echoes. The main objectives of trawling in an acoustic survey are a) to obtain a sample from the school or the layer that appears as an echo trace on the sounder for echo trace identification and allocation into species and b) to get biological information and evaluation of the size distribution of each species. Therefore, the

trawling gear used is of no importance as long as it is suitable to catch a representative sample of the target-school or layer.

In addition, the sampling intensity can not be pre-determined because of the objectives of the acoustic survey *per se*. The sampling intensity in an acoustic survey depends on the size of the area covered, the frequency of occurrence of different echo traces in the sounder and the spatial characteristics of fish aggregations. In addition, the geographical coordinates or the sampling depth of the hauls can not be pre-determined because pelagic species execute extended horizontal and vertical movements. Characteristics of schools might change depending on the area, the time period or even the fishing pressure. Therefore, the sampling strategy has to be adaptive depending on the school characteristics per area, time period and year.

Taking into account, in the framework of a common protocol, the different research vessels used and the peculiarities of each area the following points have been agreed:

- A pelagic trawl will be used in all areas for sampling,
- Maximum codend mesh size should be equal to 24 mm (side of mesh equal to 12 mm). The codend and trawl characteristics used in each area will be reported.
- The duration of hauls should be no less than 30 min for unknown echoes and when multi-species, scattered echoes are being fished.
- Vessel speed during fishing should be 3.5–4.5 knots
- The total number of hauls must be adequate in order to a) ensure identification of echo traces; b) obtain a representative length structure of the population for each target species; c) obtain species composition and biological samples.

It was agreed that the following biological and oceanographic parameters will be collected:

1) Since the environmental parameters are very important for small pelagic fish, a minimum of 3 CTD stations should be held per transect or over a grid of stations with density adequate to describe the oceanography of the surveyed area. The minimum set of parameters that should be measured in the water column will be temperature and salinity.

2) Regarding the biological parameters, the composition of the pelagic community should be reported as Biomass per species and Number per species for each haul.

In addition, the Length frequency distribution (0.5 cm) should be estimated from a representative sample for each species per haul. Total length will be measured for all species. The size of each sample should be at minimum that described in the respective protocol of the Data Collection Regulation (DCR). It was also agreed that the Length– Weight relationship for all species will be estimated and reported.

Furthermore, a representative Age Length Key (ALK) that will be used for the conversion of abundance indices to abundance-at-age should be obtained for the target species, anchovy and sardine. The mean length-at-age will also be estimated and reported.

Table 3. Summary of the common protocol for the Pan-MEditerranean Acoustic Survey (MEDIAS).

Survey Identity	
Geographic area	Should be reported
Size of Area covered	Should be reported
Days at sea	Should be reported
Vessel	Should be reported
Period of survey	A) The survey will cover the major anchovy stocks during the spawning period (summer) B) The spawning stock of the shared anchovy stock in the north western Mediterranean will be fully covered by a southern extension of the Gulf of

	Lions survey in summer. C) The valuable time series of the Spanish anchovy recruitment survey should be continued.
Echo sounder parameters	
Echo sounder	Split beam
Frequency for assessment (kHz)	38
Complementary frequencies (kHz)	120, 200 depending on availability.
Pulse duration (ms)	1 ms
Beam Angle	Should be reported
Ping rate	Maximum depending on depth
Calibration (No per survey)	A calibration report should be given (Annex III) One calibration per survey
Threshold for acquisition (dB)	-80
Threshold for assessment (dB)	-70 to -60 (reported)
Survey design	
Transects design	Perpendicular to the coastline/bathymetry, otherwise depending on topography The survey design should be reported.
Inter-transect distance (NM)	Max <=12 NM.
Time of day for acoustic sampling	Day time. Otherwise, in cases of time limitation and if echo allocation into species does not depend on school shape identification (in this case justification of the accuracy of results will be presented)
EDSU (nm)	1 NM
Distance from the coast according to the Bottom depth (min, m)	At least 20 m bottom depth, minimum 10 m of echo-sampling.
Echo sounding depth (min, m)	Depending on the draught of RV. Should be reported
Echo sounding depth (max, m) recording.	200 m
Vessel speed	8-10 knots
Software for analysis	Movies and/or Echoview
File format	*.hac
Inter - transect	Acoustic energy in the inter-transect track will not be taken into account
Applied TS (dB)	Keep historical TS equations.
Echo partitioning into species	Echo trace classification based on echogram visual scrutinisation • Direct allocation and • allocation on account of representative fishing station
Abundance estimates	
Abundance indices estimated	• Total fish NASC per EDSU • Target Species NASC per EDSU • Biomass per EDSU per target species • Numbers per EDSU per target species • Number/age/Target species • Biomass/age/Target species
Maps and charts	• Point maps of total fish NASC • Point maps of target species in NASC/mile; biomass / mile. • Catch compositions of the hauls, pie-charts indicating biomass per species
Common database	Issues of common database will be established by the participants Discussed the possibility to collaborate with the Atlantic survey
Fish sampling	
Target species	Anchovy, Sardine
Other species	Biological data for all species in the pelagic community: Length-Weight relationships; Length distribution.
Fishing gear	Pelagic trawl, Codend and trawl characteristics should be reported. Max Codend mesh size = 24 mm (side of mesh = 12 mm).
Duration of haul	Minimum 30 min for unknown echoes
Vessel speed during fishing	3.5 – 4.5 knots
Sampling intensity, no of hauls	The total number of hauls has to be adequate to

	• ensure identification of echo traces • obtain length structure of the population • obtain species composition • get biological samples
Biological and oceanographic parameters	
Length	All species: Total length (TL), Length frequency distribution (0.5 cm)
Age readings, ALK	Sardine, Anchovy: Mean TL at age Sample sizes according to the new DCR.
Length - Weight	All pelagic species
Oceanographic. Parameter (CTD)	Minimum 3 CTD per transect or grid of stations with density adequate to describe the oceanography of the area. Minimum variables: T, S

ANNEX I

List of participants

Name	e-mail	Country	
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Agenda of the MEDIAS meeting
Adoption of a common protocol for Mediterranean Acoustic Surveys
in the framework of European Data Collection Regulation
Athens 25–26 February 2008

Monday 25/2/2008
9:00 - 9:20: Welcome of the participants. Definition of the agenda.
9:20 – 10:50: Presentation by Dr. Antonio Cervantes of the background and status of the Pan-
        Mediterranean Research Survey.
9:50 – 10:00: Questions - discussion
10:00 - 10:20: Presentation of the protocols followed by each survey up to now (Table I).
10:20 – 11:00: Presentation of the protocols followed by each survey up to now (Table I).
        Definition of the list of issues that should be discussed and included in the common
        protocol.
11:00 – 11:20: Coffee break
11:20 – 13:00: Definition of the list of issues that should be discussed and included in the common
        protocol. (Continued from previous)
13:00 – 15:00: Lunch break
15:00 – 16:30: Discussion on the common protocol
16:30-16:50: Coffee break
16:50 – 19:00: Discussion on the common protocol (Continued from previous)
Tuesday 26/2/2008
9:00 – 11:00: Discussion and conclusion on the common protocol(Continued from previous)
11:00 – 11:30: Coffee break
11:30 – 13:00: Discussion and conclusion on the common protocol
13:00 – 15:00: Lunch break
15:00 – 16:30: Adoption of the report
16:30-16:50: Coffee break
16:50 - 18:00 Adoption of the report
18:00 End of meeting

ANNEX III

Calibration report

Calibration report	
Frequency (kHz)	
Echosounder type	
Transducer serial no.	
Vessel	
Date	
Place	
Latitude	
Longitude	
Bottom depth (m)	
Temperature (^{o}C) at sphere depth	
Salinity (psu) at sphere depth	
Speed of sound (ms^{-1})	
TS of sphere (dB)	
Pulse duration (s)	
Equivalent 2-way beam angle (dB)	
Receiver delay (s)	
Default Sv transducer gain	
Iteration no. (N. of calibrations)	
Time	
Range to half peak amplitude (m)	
Range to sphere (m)	
Theoretical NASC (m^2 nm^{-2})	
Measured NASC (m^2 nm^{-2})	
Calibrated Sv transducer gain	
Delta G=New gain-Old gain	
Correction factor for pre-calibration NASCs on EK	
Correction factor for pre-calibration Sv's	
Default TS transducer gain	
Time	
Measured TS	
Calibrated TS gain	